This listing of claims will replace all prior ve:sions, and listings, of claims in the application:

1   Claim 1 (currently amended):  For use with a nod³, a
2   method comprising:
3         a)  accepting, using the node, status infor:nation
4         from at least two different <u>kinds of routin]</u>
5         protocols;
6         b)  composing, using the node, an aggregate¹ message
7         including <u>at least two indicators, each ind[cator</u>
8         <u>identifying a different one of the at least two</u>
9         <u>different kinds of routing protocols and</u> th³
10         <u>corresponding</u> status information from <u>each</u> ɔf the at
11         least two different <u>kinds of routing</u> protocɔls as
12         data within the aggregated message; and
13         c)  sending, using the node, the aggregated message
14         towards a neighbor node.

1   Claim 2 (previously presented):  The method of claim 1
2   further comprising:
3         d)  maintaining, using the node, a first ti:ner for
4         tracking a send time interval, wherein the ɜcts of
5         composing the aggregated message and sendin] the
6         aggregated message are performed after expi:ation of
7         the first timer; and
8         e)  restarting, using the node, the first t:mer
9         after the aggregated message is sent.

1   Claim 3 (previously presented):  The method of claim 2
2   wherein the aggregated message further includes ɜ dead
3   time interval, and wherein the send time interval is less
4   than the dead time interval.

2

1 Claim 4 (previously presented): The method of c.aim 2
2 wherein the aggregated message further includes a dead
3 time interval, and wherein the send time interva.. is no
4 more than one third of the dead time interval.


1 Claim 5 (original): The method of claim 2 where.n the
2 send time interval is less than one second.


1 Claim 6 (original): The method of claim 2 where.n the
2 send time interval is less than 100 msec.


1 Claim 7 (previously presented): The method of c.aim 1
2 wherein the aggregated message further includes a dead
3 time interval.


1 Claim 8 (previously presented): The method of claim 1
2 wherein the act of sending the aggregated messag?
3 includes providing the aggregated message in an Internet
4 protocol packet.


1 Claim 9 (previously presented): The method of claim 8
2 wherein the act of sending the aggregated messag? towards
3 the neighbor node includes setting a destination address
4 in the Internet protocol packet to a multicast a ldress·
5 associated with routers that support aggregated protocol
6 liveness.


1 Claim 10 (currently amended): The method of claim 1
2 wherein the neighbor node has at least one routing
3 protocol peering with at least one of the at least two
4 routing protocols.


3

1    Claim 11 (currently amended): The method of cla..m 1
2    wherein the status information includes a <u>routin&#39;[</u>
3    protocol state selected from a group of <u>routing</u> protocols
4    states consisting of (A) protocol up, (B) protoc&#253;l down,
5    (C) protocol not reporting, and (D) protocol res`:arting.

1    Claim 12 (currently amended): For use with a no&#183;le, a
2    method comprising:
3         a)  receiving, using the node, an aggregate&#183;l message
4         including
5                 i)  for a first set of at least two di:ferent
6                 <u>kinds of routing</u> protocols of a neighb&#242;r node,
7                 <u>at least two indicators, each indicato</u>:
8                 <u>identifying a different one of the at .east two</u>
9                 <u>different kinds of routing protocols</u> a&#183;id
10                 <u>corresponding</u> status information for e&#183;ich of
- 11                 the protocols of the first set of the &#183;it least
12                 two different <u>kinds of routing</u> protoco.s as
13                 data within the aggregated message, an&#183;i
14                 ii)  a time interval; and
15         b)  updating, using the node, neighbor node protocol
16         status information using the aggregated mes;age.

1    Claim 13 (currently amended): The method of cla.m 12
2    wherein the act of updating neighbor node protoc&#242;l status
3    information includes
4               i)  setting, using the node, a first t.mer to
5               the time interval and starting the fir;t timer,
6               ii)  if the first timer expires, setti.ig, using
7               the node, the status of each of the pr&#183;)tocols
8               of the neighbor node to down, and

4

9                iii)   if a further message, sourced from the

10             neighbor node, and including

11                   A)   for a second set of at least two

12                   protocols, <u>at least two indicators, each</u>

13                   <u>indicator identifying the at least two</u>

14                   <u>routing protocols and corresponding</u> status

15                   information for each of the <u>routing</u>

16                   protocols of the second set, and

17                 B)   a new time interval,

18          is received then, resetting, using the node,

19          the first timer to the new time interval and

20          restarting the first timer.

1    Claim 14 (original):  The method of claim 13 wherein each

2    of the time interval and the new time interval is less

3    than one second.

1    Claim 15 (currently amended):  The method of claim 12

2    wherein the status information includes a <u>routing</u>

3    protocol state selected from a group of <u>routing</u> protocols

4    states consisting of (A) protocol up, (B) protocol down,

5    (C) protocol not reporting, and (D) protocol restarting.

1    Claim 16 (currently amended):  The method of claim 13

2    wherein the act of updating neighbor node <u>routing</u>

3    protocol status information further includes

4              iv)   if the further message is received then,

5             in addition to resetting the first timer to the

6             new time interval and restarting the first

7             timer, further

8                 A)   determining, using the node, whether

9                 the first set of at least two <u>routing</u>

5

10    protocols is the same as the second set of
11    at least two <u>routing</u> protocols,
12    B)    if the first set of at least two
13    <u>routing</u> protocols is determined to be the
14    same as the second set of least <u>routing</u>
15    two protocols, then for each of the at
16    least two <u>routing</u> protocols of both the
17    first and second sets having a changed
18    status, informing, using the node, a
19    locally running instance of the <u>routing</u>
20    protocol of the changed status of its peer
21    <u>routing</u> protocol of the neighbor node, and
22    C)    if the first set of at least two
23    <u>routing</u> protocols is determined to be
24    different from the second set of at least
25    two <u>routing</u> protocols, then
26         1)    for any <u>routing</u> protocol in the
27         second set but not in the first set,
28         informing, using the node, a locally
29         running instance of the <u>routing</u>
30         protocol of the status indicated in
31         the further message of its peer
32         <u>routing</u> protocol of the neighbor
33         node, and
34         2)    for any <u>routing</u> protocol in the
35         first set but not in the second set,
36         informing, using the node, a locally
37         running instance of the <u>routing</u>
38         protocol that the status of its peer
39         <u>routing</u> protocol of the neighbor node
40         is down.

6

1 Claim 17 (currently amended): The method of claim 16,

2 wherein each of the aggregated message and the further

3 message include an indication of a relative message age,

4 and wherein the act of updating neighbor node <u>routing</u>

5 protocol status information includes,

6           iv)    if the further message is received then,

7           in addition to resetting the first timer to the

8           new time interval and restarting the first

9           timer, further

10                A)    determining, using the node, whether

11                the further message is younger than the

12                aggregated message, and

13                B)    if it is determined that the further

14                message is not younger than the aggregated

15                message, then discarding, using the node,

16                the further message.

1 Claim 18 (currently amended): The method of claim 13

2 wherein each of the aggregated message and the further

3 message include an indication of a relative message age,

4 and wherein the act of updating neighbor node <u>routing</u>

5 protocol status information includes,

6           iv)    if the further message is received then,

7           in addition to resetting the first timer to the

8           new time interval and restarting the first

9           timer, further

10                A)    determining, using the node, whether

11                the further message is younger than the

12                 aggregated message, and

13                B)    if it is determined that the further

14                message is not younger than the aggregated

7

15          message, then discarding, using the node,

16          the further message.


1    Claim 19 (currently amended):  A method for monitoring

2    liveness of multiple protocols, the method comprising:

3          a)   determining, at a first node, status information

4          for at least two different kinds of routing

5          protocols;

6          b)   sending, from the first node, an aggregated

7          message including at least two indicators, each

8          indicator identifying a different one of the at

9          least two different kinds of routing protocols and

10         the corresponding determined status information for

11         the at least two different kinds of routing

12         protocols as data within the aggregated message to a

13         second node;

14         c)   receiving, at the second node, the aggregated

15         message; and

16         d)   updating, by the second node, first node routing

17         protocol status information using the aggregated

18         message.


1    Claim 20 (currently amended):  The method of claim 19

2    wherein the aggregated message further includes a first

3    time interval, and wherein the act of updating neighbor

4    node routing protocol status information includes

5          i)    setting a timer to the first time interval;

6          ii)   starting the timer;

7          iii)  determining whether or not a further

8               message including routing protocol status

9               information is received from the first node by


8

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10          the second node before the expiration of the
11          timer; and
12              iv)  if it is determined that a furthe: message
13              including routing protocol status info::mation
14              is not received from the first node by the
15              second node before the expiration of the timer,
16              then informing peer routing protocols of the
17              second node that the at least two rout.ng
18              protocols of the first node are down.
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1   Claim 21 (currently amended):  The method of cla..m 19
2   wherein the status information includes a routin‹[
3   protocol state selected from a group of protocol:; states
4   including at least (A) protocol up, (B) protocol down,
5   (C) protocol not reporting, and (D) protocol res::arting.
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1   Claim 22 (currently amended):  A machine-readabl‹: medium
2   having stored thereon a machine readable aggrega:.ed
3   message comprising:
4           a)  at least two indicators, each indicator
5               identifying a different one of at least two
6               different kinds of routing protocols of n‹›de
7               stored as data within the aggregated messag‹:;
8           b) status information, for the at least two
9               different kinds of routing protocols of [[a ] the
10              node, of a state of each of the at least two routing
11              protocols stored as data within the aggregat.ed
12              message; and
13          c [[b]])  a dead interval.
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1   Claim 23 (currently amended):  The machine-readal›le
2   medium of claim 22 wherein the status informatioı:
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9

3   indicates a <u>routing</u> protocol state selected from a group

4   of protocols states consisting of (A) protocol up, (B)

5   protocol down, (C) protocol not reporting, and (D)

6   protocol restarting.


1   Claim 24 (original):  The machine-readable medium of

2   claim 22 further comprising:

3        c)   an identifier of the node.


1   Claim 25 (original):  The machine-readable medium of

2   claim 24 wherein the node is a router and wherein the

3   identifier is a router identifier.


1   Claim 26 (original):  The machine-readable medium of

2   claim 22 further comprising:

3        c)   an interface index.


1   Claim 27 (currently amended):  For use with a node,

2   apparatus comprising:

3        a)   at least one processor;

4        b)   at least one input device; and

5        c)   at least one storage device storing

6   processor-executable instructions which, when

7   executed by one or more processors, perform a method

8   including

9             i)   accepting status information from at least

10            two different <u>kinds of routing</u> protocols,

11            ii)  composing, using the node, an aggregated

12            message including <u>at least two indicators, each</u>

13            <u>indicator identifying a different one of the at</u>

14            <u>least two different kinds of routing protocols</u>

15            <u>and</u> the <u>corresponding</u> status information from

10

16              each of the at least two different kinds of
17              routing protocols as data within the aggregated
18              message, and
19                  iii) sending the aggregated message towards a
20              neighbor node.


1 Claim 28 (previously presented): The apparatus of claim
2 27 wherein the method further includes
3              iv) maintaining a first timer for tracking a send
4              time interval, wherein the act of composing the
5              aggregated message and sending the aggregated
6              message compose and send the aggregated message
7              after expiration of the first timer, and
8              v) restarting the first timer after the aggregated
9              message is sent.


1 Claim 29 (previously presented): The apparatus of claim
2 28 wherein the aggregated message further includes a dead
3 time interval, and wherein the send time interval is less
4 than the dead time interval.


1 Claim 30 (previously presented): The apparatus of claim
2 28 wherein the aggregated message further includes a dead
3 time interval, and wherein the send time interval is no
4 more than one third of the dead time interval.


1 Claim 31 (previously presented): The apparatus of claim
2 28 wherein the send time interval is less than one
3 second.


1 Claim 32 (previously presented): The apparatus of claim
2 28 wherein the send time interval is less than 100 msec.


11

1  Claim 33 (previously presented):  The apparatus of claim
2  27 wherein the aggregated message further includes a dead
3  time interval.


1  Claim 34 (previously presented):  The apparatus of claim
2  27 wherein the act of sending the aggregated message
3  includes providing the aggregated message in an internet
4  protocol packet.


1  Claim 35 (currently amended):  The apparatus of claim 34
2  wherein the act of sending the aggregated message
3  includes setting a destination address in the Internet
4  protocol packet to a multicast address associated with
5  routers that support aggregated routing protocol
6  liveness.


1  Claim 36 (previously presented):  The apparatus of claim
2  27 wherein the neighbor node has at least one protocol
3  peering with at least one of the at least two protocols.


1  Claim 37 (currently amended):  The apparatus of claim 27
2  wherein the status information includes a routing
3  protocol state selected from a group of protocols states
4  consisting of (A) protocol up, (B) protocol down  (C)
5  protocol not reporting, and (D) protocol restarting.


1  Claim 38 (currently amended):  For use with a node,
2  apparatus comprising:
3        a)  at least one processor;
4        b)  at least one input device; and
5        c)  at least one storage device storing
6            processor-executable instructions which, when


12

7    executed by one or more processors, perform a method

8    including

9        i)   receiving, using the at least one input, an

10   aggregated message including

11           A) . for a first set of at least two

12       different <u>kinds of routing</u> protocols o: a

13       neighbor node, <u>at least two indicators  each</u>

14       <u>indicator identifying a different one >f the at</u>

15       <u>least two different kinds of routing p:otocols</u>

16       <u>and corresponding</u> status information f>r each

17       of the protocols of the first set of t>e at

18       least two different <u>kinds of routing</u> p:otocols

19       as data within the aggregated message, and

20           B)   a time interval,  and

21       ii)   updating neighbor node protocol s:atus

22   information using the aggregated message.


1    Claim 39 (currently amended):  The apparatus of <:laim 38

2    wherein the act of updating neighbor node protoc<>l status

3    information includes

4            A)   setting a first timer to the time ..nterval

5            and starting the first timer,

6            B)   setting the status of each of the :outing

7            protocols of the neighbor node to down if the

8            first timer expires, and

9            C)   if a further message, sourced from the

10           neighbor node, and including

11               1)   for a second set of at least two

12               protocols, <u>at least two indicator:, each</u>

13               <u>indicator identifying the least two</u>

14               <u>routing protocols and correspondir g</u> status

13

15          information for each of the <u>routing</u>

16          protocols of the second set, and

17              2)  a new time interval,

18      is received, resetting the first timer to the

19      new time interval and restarting the first

20      timer.

1   Claim 40 (previously presented): ·The apparatus of claim

2   39 wherein each of the time interval and the new time

3   interval is less than one second.

1   Claim 41 (currently amended):  The apparatus of claim 38

2   wherein the status information includes a <u>routing</u>

3   protocol state selected from a group of protocols states

4   consisting of (A) protocol up, (B) protocol down, (C)

5   protocol not reporting, and (D) protocol restarting.

1   Claim 42 (currently amended):  The apparatus of claim 39

2   wherein the act of updating neighbor node <u>routing</u>

3   protocol status information further includes

4           D)  determining whether the first set of at

5           least two <u>routing</u> protocols is the same as the

6           second set of at least two protocols,

7           E)  if the first set of at least two <u>routing</u>

8           protocols is determined to be the same as the

9           second set of at least two <u>routing</u> protocols,

10          then for each of the at least two <u>routing</u>

11          protocols of both the first and second sets

12          having a changed status, informing a locally

13          running instance of the <u>routing</u> protocol of

14          the changed status of its peer <u>routing</u>

15          protocol of the neighbor node, and

14

16                F)   if the first set of at least two routing

17              protocols is determined to be different from

18              the second set of at least two routing

19              protocols,

20                   1)   for any routing protocol in the second

21                   .    set but not in the first set, informing a

22                   locally running instance of the routing

23                   protocol of the status indicated in the

24                   further message of its peer routing

25                   protocol of the neighbor node, and

26                   2)   for any routing protocol in the first

27                   set but not in the second set, informing a

28                   locally running instance of the routing

29                   protocol that the status of its peer

30                   routing protocol of the neighbor node is

31                   down.


1    Claim 43 (currently amended):  The apparatus of claim 42

2    wherein each of the aggregated message and the further

3    message include an indication of a relative message age,

4    and wherein the act of updating neighbor node routing

5    protocol status information includes,

6                D)   determining whether the further message is

7              younger than the aggregated message, and

8              E)   if it is determined that the further

9              message is not younger than the aggregated

10             message, then discarding the further message.

11


1    Claim 44 (currently amended):  The apparatus of claim 39

2    wherein each of the aggregated message and the further

3    message include an indication of a relative message age,

4    and wherein the act of updating neighbor node <u>routing</u>

5    protocol status information includes,

6              D)   determining whether the further message is

7              younger than the aggregated message, and

8              E)   if it is determined that the further

9              message is not younger than the aggregated

10             message, then discarding the further message.


1    Claim 45 (currently amended):  A system comprising:

2         a)   a first node adapted to

3              i)   determine status information for at least

4              two different <u>kinds of routing</u> protocols, and

5              ii)  send an aggregated message including <u>at</u>

6              <u>least two indicators, each indicator</u>

7              <u>identifying a different one of the at least two</u>

8              <u>different kinds of routing protocols and</u> the

9              <u>corresponding</u> determined status information for

10             the at least two different <u>kinds of routing</u>

11             protocols as data within the aggregated message

12             to a second node; and

13        b)   the second node adapted to

14             i)   receive the aggregated message; and

15             ii)  update first node <u>routing</u> protocol status

16             information using the aggregated message.


1    Claim 46 (currently amended):  The system of claim 45

2    wherein the aggregated message further includes a first

3    time interval, and wherein the act of updating the first

4    node <u>routing</u> protocol status information includes

5              A)   setting a timer to the first time

6              interval;

7              B)   starting the timer;


16

8       C)   determining whether or not a further

9            message including <u>routing</u> protocol status

10           information is received from the first

11           node by the second node before the

12           expiration of the timer; and

13           D)   if it is determined that a further

14           message including <u>routing</u> protocol status

15           information is not received from the first

16           node by the second node before the

17           expiration of the timer, then informing

18           peer <u>routing</u> protocols of the second node

19           that the at least two <u>routing</u> protocols of

20           the first node are down.


1  Claim 47 (currently amended):  The system of claim 46

2  wherein the status information includes a <u>routing</u>

3  ·protocol state selected from a group of protocols states

4  including at least (A) protocol up, (B) protocol down,

5  (C) protocol not reporting, and (D) protocol restarting.


1  Claim 48 (currently amended):  The method of claim 1

2  wherein the status information is local <u>routing</u> protocol

3  status information.


1  Claim 49 (currently amended):  The method of claim 1

2  wherein the status information is local status

3  information and wherein each of the at least two

4  different <u>kinds of routing</u> protocols is [[bring]] <u>being</u>

5  run locally on the node.


1  Claim 50 (currently amended):  The method of claim 1

2  wherein the status information of at least one of the at


17

3     least two different <u>kinds of routing</u> protocols included

4     in the aggregated message includes a <u>routing</u> protocol

5     state set to protocol not reporting.

 

1     Claim 51 (currently amended): The method of claim 1

2     wherein the status information of at least one of the at

3     least two different <u>kinds of routing</u> protocols included

4     in the aggregated message includes a <u>routing</u> protocol

5     state set to protocol restarting.

 

1     Claim 52 (currently amended): The method of claim 12

2     wherein the status information of at least one of the at

3     least two different <u>kinds of routing</u> protocols included

4     in the first set of at least two different <u>kinds of</u>

5     <u>routing</u> protocols included within the aggregated message

6     includes a <u>routing</u> protocol state set to protocol not

7     reporting.

 

1     Claim 53 (currently amended): The method of claim 12

2     wherein the status information of at least one of the at

3     least two different <u>kinds of routing</u> protocols included

4     in the first set of at least two different <u>kinds of</u>

5     <u>routing</u> protocols included within the aggregated message

6     includes a <u>routing</u> protocol state set to protocol

7     restarting.

 

1     Claim 54 (new): The method of claim 1 wherein a first

2     one of the at least two indicators identifies a first

3     kind of routing protocol from a group of routing

4     protocols consisting of (A) Border Gateway Protocol

5     (BGP), (B) Intermediate system to intermediate system

6     (IS-IS), (C) Open Shortest Path First - Version 2 (OSPF

18

7    v2), (D) Open Shortest Path First -Version 3 (OS?F v3),

8    (E) Routing Information Protocol Version 1/Versi·)n 2 (RIP

9    v1/v2), (F) Routing Information Protocol next ge:ieration

10   (RIP-ng), (G) Protocol-Independent Multicast (PIM), (H)

11   Distance Vector Multicast Routing Protocol (DVM(P), (I)

12   Label Distribution Protocol (LDP), (J) Resource

13   Reservation Protocol (RSVP) and (K) Link Managem·:nt

14   Protocol (LMP), and

15       wherein a second one of the at least two in licators

16   identifies a second kind of routing protocol, wh[ch is

17   different from the first kind of routing protocoL

18   identified, from a group of routing protocols co isisting

19   of (A) Border Gateway Protocol (BGP), (B) Interm?diate

20   system to intermediate system (IS-IS), (C) Open 3hortest

21   Path First - Version 2 (OSPF v2), (D) Open Short?st Path

22   First -Version 3 (OSPF v3), (E) Routing Informat[on

23   Protocol Version 1/Version 2 (RIP v1/v2), (F) Ro ]ting

24   Information Protocol next generation (RIP-ng), (3)

25   Protocol-Independent Multicast (PIM), (H) Distan:e Vector

26   Multicast Routing Protocol (DVMRP), (I) Label

27   Distribution Protocol (LDP), (J) Resource Reserv ition

28   Protocol (RSVP) and (K) Link Management Protocol (LMP).

1    Claim 55 (new): The method of claim 12 wherein i first

2    one of the at least two indicators identifies a first

3    kind of routing protocol from a group of routing

4    protocols consisting of (A) Border Gateway Proto:ol

5    (BGP), (B) Intermediate system to intermediate s/stem

6    (IS-IS), (C) Open Shortest Path First - Version ? (OSPF

7    v2), (D) Open Shortest Path First -Version 3 (OS?F v3),

8    (E) Routing Information Protocol Version 1/Versi)n 2 (RIP

9    v1/v2), (F) Routing Information Protocol next ge ieration

19

10   (RIP-ng), (G) Protocol-Independent Multicast (PIM), (H)

11   Distance Vector Multicast Routing Protocol  (DVMRP), (I)

12   Label Distribution Protocol (LDP), (J) Resource

13   Reservation Protocol (RSVP) and (K) Link Management

14   Protocol (LMP), and

15        wherein a second one of the at least two indicators

16   identifies a second kind of routing protocol, which is

17   different from the first kind of routing protocol

18   identified, from a group of routing protocols consisting

19   of (A) Border Gateway Protocol (BGP), (B) Intermediate

20   system to intermediate system (IS-IS), (C) Open Shortest

21   Path First - Version 2 (OSPF v2), (D) Open Shortest Path

22   First -Version 3 (OSPF v3), (E) Routing Information

23   Protocol Version 1/Version 2 (RIP v1/v2), (F) Routing

24   Information Protocol next generation (RIP-ng), (G)

25   Protocol-Independent Multicast (PIM), (H) Distance Vector

26   Multicast Routing Protocol  (DVMRP), (I) Label

27   Distribution Protocol (LDP), (J) Resource Reservation

28   Protocol (RSVP) and (K) Link Management Protocol (LMP).

20